SYMONS'S
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SCIENCE AT SOUTH KENSINGTON.

(Continued from page 72).

At the present date (July 11th) it is still impossible to obtain a catalogue of any kind whatever. The first edition, in spite of all its faults, was exhausted a few days after the opening; weeks have come and gone, but the second edition has not appeared in public. Meanwhile, the London season has nearly run its course, and such persons as have visited the collection, have wandered through it without a guide, either good, bad, or indifferent. We shall not give currency to any rumours respecting this second edition, but proceed to a far more important matter.

The name of the British Government was freely used in order to obtain a collection of apparatus; passing all such trivial matters as seem to have nearly swamped South Kensington, we come to the question, whether there is or is not to be an Official Catalogue worthy of the Exhibition, of the Nation, and of Science? If it has been wise to spend what has gone beyond recall, it is surely desirable to turn the collection to the best account, to do something more than continue an extra lounge for a few thousand natives and foreigners, and to prepare such a catalogue as we have indicated.

If the authorities do not bestir themselves, it may finally result that the only approach to a detailed and systematic notice will be that in these pages. Surely when printing costs them nothing, they who can have hundreds or thousands of pounds for asking, will not fold their arms, and say that it is too much trouble.

MACNEILL'S MARIOTTI BAROMETER.

The Rev. J. M. Du Port has called our attention to the fact that the description of this instrument on p. 71 of our last number is incomplete. These articles seem likely to be so long that we suppressed the following paragraphs; we, however, admit that they are essential, are glad that the error was pointed out, and insert them. Of course, the letters refer to the engraving in our last.

INSTRUCTIONS.—The Barometer should be suspended in the shade, in a good light, and time should be given for the instrument to take the temperature of the place before making an observation; and two readings should not be taken within

a less interval than ten minutes, so as to allow any heat generated in the first observation to escape before taking another.

The instrument should not be handled immediately before taking an observation, nor should the observer approach it from a fire, or with hands and clothes of a temperature differing materially from that of the instrument, otherwise the volume of air just admitted might be to some extent affected, notwithstanding the insulated covering of the air chamber.

When the instrument is hung up for observation, the stopcock *A* should be opened, and the mercury raised by the screw *B*, until it nearly touches the bottom of the tube *C*, as seen through the lower slit or opening in the ebonite body. After an interval of a few minutes the instrument is ready for an observation, and the mercury should then be quietly raised until it CLOSES the bottom of the tube *C*, after which the screw *B* may be turned more rapidly, until the mercury appears through the diaphragm *D* in the form of a drop at *E*, which drop or convex surface must be raised so as barely to intercept the light, and form a tangent to the top opening, just, or barely, excluding the light (as in a Standard Barometer), by keeping the eye in the same plane with the back and front lower edges, which is the zero of the instrument.

The stopcock *A* is then to be turned off and the vernier set, so that its lower edge shall exactly form a tangent to the convex surface of the mercury in the tube *F*, just excluding the light whilst keeping the eye in the same plane with the lower back and front edges of the vernier (the time occupied should be about one minute from the closing of the tube *C* until the vernier is set); after which the reading may be noted at leisure, and the usual corrections for temperature and index error made as in the Standard Barometer, the same tables being alike applicable to both. No other corrections are necessary in the Mariotti Barometer.

The stopcock *A* should be then opened and the mercury allowed to descend to a little below the bottom of the tube *C*. The instrument will then be ready for the next reading.

The glass tube *C F* being open at the top, the instrument should not be laid down on its side until all the mercury is lowered into the cistern and the stopcock *A* closed, when it may be placed in any position.

ANTIQUE BAROMETERS.

We believe that the only antique barometers not described last month are—[2809 *a*1] "First barometer, with weights, by Conté. Used in the Expedition of Egypt;" and [2809 *a*2] "Barometer, with overfall, constructed by Megnié, for Delavoisier." We simply record their presence, because we do not understand that by Conté, and that by Megnié, though very interesting on account of its age and the associations connected with its previous owner, is not otherwise of importance; both these instruments have been lent by the Director of the Conservatoire des Arts et Métiers, Paris.

MISCELLANEOUS MERCURIAL BAROMETERS.

A standard barometer, with electrical adjustment, is exhibited by Negretti and Zambra, who thus describe its construction and use:—

"This barometer consists of an upright glass tube dipping into a glass cistern of mercury, so contrived, that an up-and-down movement, by means of a screw, can be imparted to it. Through the top of the tube a piece of platina wire is passed and hermetically sealed. The cistern also has a metallic connection, so that by means of covered copper wires (in the back of the frame) a galvanic circuit is established;

another connection also exists by means of a metallic point dipping into the cistern. The circuit, however, can be cut off from this by means of a switch placed about midway up the frame. On one side of the tube is placed a scale of inches; with a small circular vernier, divided into 100 parts, connected with the dipping point, and working at right angles with this scale.

"For taking an observation, a galvanic battery is connected by two binding screws at the bottom of the frame. The switch is turned upwards, thereby disconnecting the dipping point; the cistern is then screwed up, so that the mercury in the tube is brought into contact with the platina wire at the top; the instant this is effected a *magnetic needle* arranged as a galvanometer on the barometer board will be deflected. The switch is now turned down; by so doing the connection with the upper wire or platina is cut off, and established between the dipping point carrying the circular vernier and the bottom of the cistern; the point is now screwed by means of the milled head until the *needle* is again deflected, and the line on the vernier cutting the division on the scale is the exact reading of the barometer."

Howson's Patent Long Range Barometer (fig. 13) is exhibited by Negretti and Zambra. This is the best of the open scale barometers, and very well adapted for the halls of large houses, clubs, &c., but it is not an instrument of scientific precision.

"In this instrument the tube is fixed, but its cistern is movable and sustained by the upward pressure of the atmosphere. The diameter of the tube is about an inch. A long glass rod is fixed to the bottom of the glass cistern, where a piece of cork or some elastic substance is also placed. The tube is filled with mercury; the glass rod is plunged into the tube as it is held top downwards, until the cork gets close up to the tube and fits tightly against it. The pressure against the cork simply prevents the mercury from coming out while the instrument is being inverted. When it is inverted, the mercury partly falls and forms an ordinary barometric column. When the top is held, the cistern and glass rod, instead of falling away, remain suspended. The glass rod, being so much lighter than mercury, floats and sustains the additional weight of the cistern by its buoyancy, and the atmosphere acting upon the mercury, keeps up the barometric column. Supposing there is a rise in the barometer, the atmosphere presses more mercury up the tube. This mercury is taken out of the cistern, which of course becomes lighter, and therefore the rod and cistern float up a little higher, which thus causes the column of mercury to rise still more. The increased pressure and buoyancy thus acting together, increase the ascent in the barometric column, as shown by the fixed scale. Supposing there were a decrease of pressure, the mercury would fall, come into the cistern, make it heavier, and increase the fall. Fig. 13 shows the appearance of the instrument as mounted in an ornamental carved oak case. Readings may be taken by this Barometer to three places of decimals without a vernier."

Prof. Bohn, of Aschaffenburg, sends a mercurial barometer [2802], which, it is said, "can be rendered entirely void of air in half-an-hour without boiling." It is, however, adapted only for laboratory use, as will be at once evident on reference to its representation on fig. 14, and from our mentioning that with the exception of an iron supporting rod, the instrument is wholly of glass, even the divisions being etched on the tube. The following is Prof. Bohn's description :—

A barometer to be made easily and in short time, without boiling of the mercury, perfectly empty of air.

Pour some mercury very dry, and heated to nearly 100° C, by C, with a funnel in its tube, whilst the stopcock B is closed, A open, untill some mercury issues at A.

Close stop A and open B, mercury will issue.

Wait for five minutes, in order that the air absorbed by the mercury, and adhering to the glass, has time to disengage in the barometrical chamber.

Close B, let A be closed also, and pour some mercury by C, filling quite the tube. Open stop A, and let issue any drops. Afterwards close A, open B, mercury issues; wait for two minutes, close B.

Repeat the operations in the said order five or six times more. When for the last time mercury stands near C, and A is closed, varnish over the stopcock with a solution of collodium, in order to render the closure better; open then B as long as mercury reaches at X.

The difference of the lectures on the division at X and at Y is the height of the barometer.

If the vacuity in the barometrical chamber is a perfect one, the difference of the two mercurial columns will remain the same when any more mercury is filled in or let out.

Prof. Kruezer exhibits a Compensated Barometer (fig. 15), [2805] of which the following explanation is given :—

"The upper part of the tube is enlarged to a retort, the volume of which corresponds to a length of one or two metres of the tube. A quantity of air is introduced into the tube, the pressure of which is equal to about $34{\cdot}5^{mm.}$ mercury. The scale is divided with due regard to the effect of that depression, the zero having been adjusted by comparison with a standard barometer, the reading will immediately give the barometer height reduced to normal temperature of mercury and scale. One millimetre of the scale $= \frac{1^{mm.}}{\frac{P+p}{p} + \frac{345}{\lambda}}$, p being the area of the tube, P of the cistern, and $p.\lambda$ the volume of the upper part above $725{\cdot}5^{mm.}$ from the level in the cistern."

An instrument of this construction has been in use for some years at the Helsingfors Observatory.

A is the metal cover of the "retort" or enlarged upper part of the barometer tube; A is the frame carrying the vernier; B is the rack

for adjusting the lower end of the scale at c to the surface of the mercury in D.

From this it appears that in this instrument air has been purposely introduced to the top of the barometric column, and its expansion is employed to correct for the variation (1) in the specific gravity of the mercurial column, and (2) in the length of the measuring scale, produced by the alterations of temperature to which the instrument is subjected. The above variations act in the same direction, for increase of heat expands the mercury, renders it of less specific gravity, and, therefore, lengthens the column; but the same rise in temperature lengthens the brass scale by which the length of the column is measured. The inventor appears to have computed the volume of air of which the expansion would neutralize this joint action; but it seems to us that this expansion can only be correct for some one pressure. Moreover, as it is impracticable to test by the usual vacuum tap, there is no possibility of ascertaining if any other air has gained access to the top—in fact, it is impossible to ascertain whether the instrument is right or wrong except by comparing it with another.

The Meteorological Committee exhibit one of the barometers by Tonnelot, of Paris, which have closed cisterns like the Kew pattern, but the scale is not contracted, and therefore every reading has to be corrected for the varying level of the mercury in the cistern. This form of instrument is becoming generally used in France, and though we think it inferior both to the Kew pattern and to Fortin's, it is undoubtedly a good instrument, and is not costly.

The Deutsche Seewarte were to send [2803] one of Köppen's improved Kupfer's Barometers, with moveable bottom, constructed by Fuess, of Berlin, but we have not yet found it.

M. Gloukhoff, of St. Petersburgh, exhibits a new form of barometer [2800*a*], by Brauer, of Pulkowa, (fig. 16) in which the principal novelty appears to be the forcing of the mercury at each observation into an entirely open cylinder. The scale, like those of Newman's Fortin barometers (now made by Negretti), and of Casella's Observatory Standard, is movable, and its lower end is brought into contact with the mercury in the cistern at each observation. This arrangement is probably cheaper than the Fortin, but it seems to us that the mercury must soon become very foul, both by oxidation and by collecting dust.

Hicks exhibits a new pattern of the old Hermetic Barometer (fig. 17). It essentially consists of two mercurial thermometers, an ordinary one to give the temperature of the instrument, and one with a very long scale and a flat circular bulb of 1·4 inch diameter; the sides of the latter will evidently be pressed together by increase of atmospheric pressure, and thus answer roughly as an indicator thereof; the change in the volume of the mercury due to temperature is provided for by a sliding scale, exactly as in sympiesometers. Mr. Hicks probably ex-

hibits this rather as a specimen of workmanship, and a novelty, than with any idea that it is adapted for mountain work.

Wild's adjustable syphon barometer is shown by the Meteorological Committee [2784], and also [2800] by the Geneva Association for constructing Scientific Instruments. As, however, our engraving of it is not ready, and the instrument is one extensively used, we defer its description for a month.

SELF-RECORDING BAROMETERS—MERCURIAL.

The series of these instruments very good. The earliest is Kreil's Barograph [2891], exhibited by the Kew Committee; it consists of a syphon barometer with ivory float on the short leg, with a cord passing upwards and round a sector at one end of a horizontal lever; the other end of this lever carries carries a pencil. Behind the pencil is an oblong frame containing a sheet of paper, and this frame is drawn laterally by clockwork. At the other end of the apparatus is a clock which (1) draws the above-mentioned frame along horizontal rods, and (2) causes a hammer to strike the pencil every five minutes, and thus produces a series of dots upon the paper, higher or lower according to the height of the mercury in the barometer tube.

Milne's Barograph, exhibited by the Meteorological Committee, is similar to Kreil's in all essential parts, but is much more compact and handy.

Negretti's Improved Milne's Barograph carries this system of registration as near to perfection as is possible. The general principle is represented in fig. 18, but the specimen exhibited is more handsome than the engraving. The barometer tube remains as in Kreil's instrument, and also the float A, the chain from it, and half of the lever; but instead of the pencil being attached to the other end of the lever it will be seen that there is another arc, and a chain from it to the indicator B. Hence it is evident that the up and down motion of A is necessarily followed by a similar but reversed motion of B. As the mercury in A falls when the barometer rises, it follows that the indicator B rises when the barometric pressure increases, and falls when it falls. The indicator B, therefore, shows upon the scale C the reading of the barometer at any given instant. The chief objections to Kreil's and the ordinary Milne's barographs are (1) the friction of drawing the recording frame horizontally, (2) the fact that the pencil traverses an arc, and thus the time scale is necessarily curved. These objections are both removed by Negretti's arrangement, (1) by substituting a rotating cylinder for the traversing frame, and (2) by the second arc on the lever. The indicator B is driven against the paper-covered cylinder by the hammer of the clock below.

Redier's Barograph has been so recently (Met. Mag., April, 1875) engraved and fully described in these pages, that we need only here report the exhibition of a specimen, and our regret that it has not been provided with recording sheets, and kept in operation.

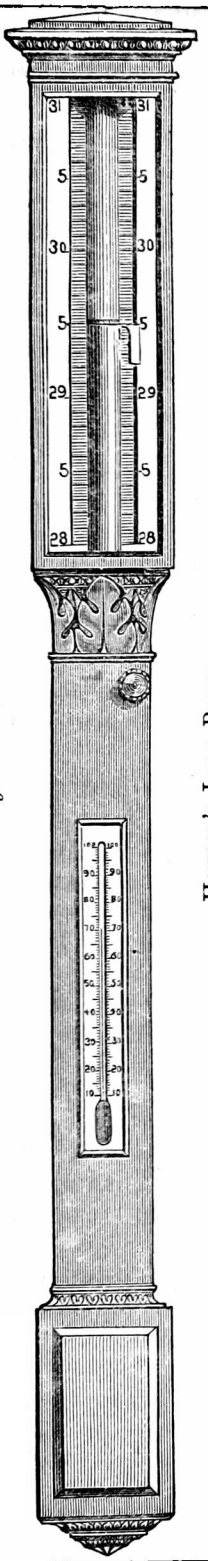
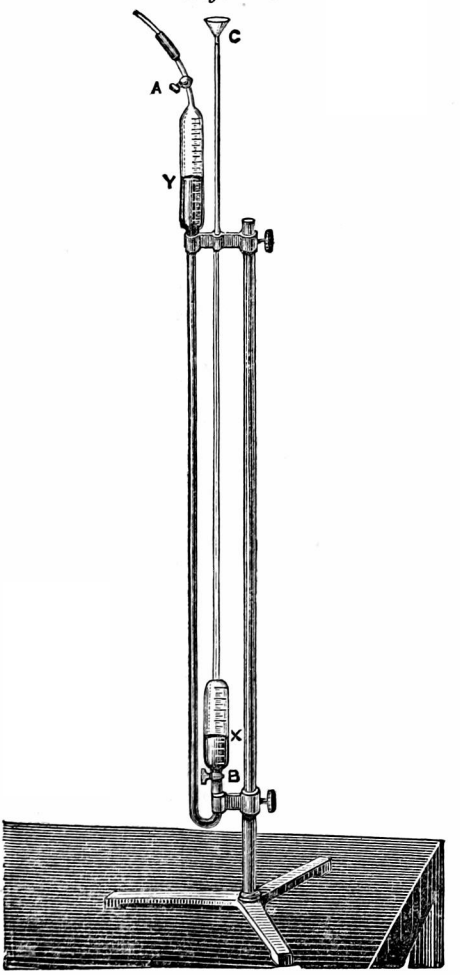


Fig. 13.

Howson's Long Range.

Fig. 14.



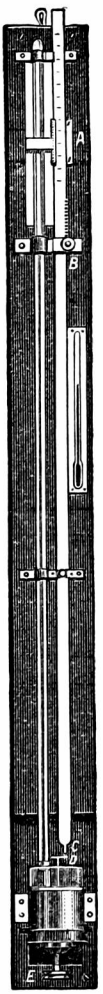
Bohn's.

Fig. 15.

Kruezer's.

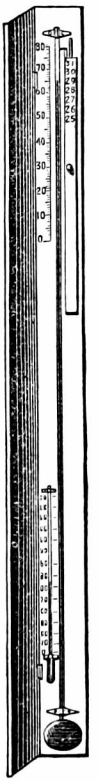
MISCELLANEOUS AND RECORDING BAROMETERS.

Fig. 16.



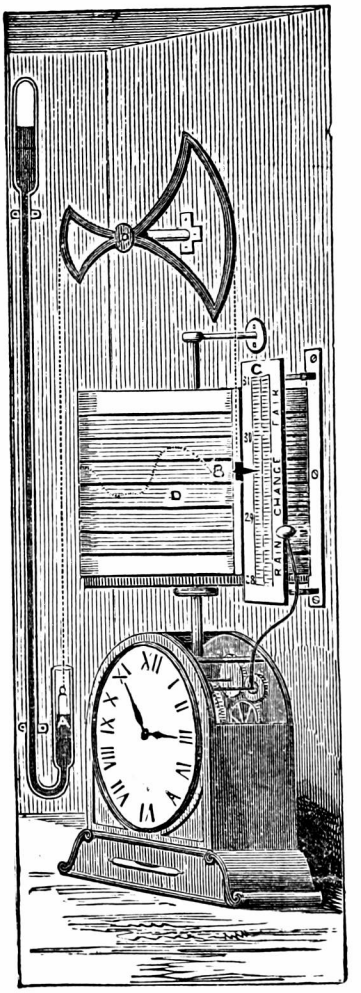
Gloukhoff's.

Fig. 17.



Hicks's Hermetic.

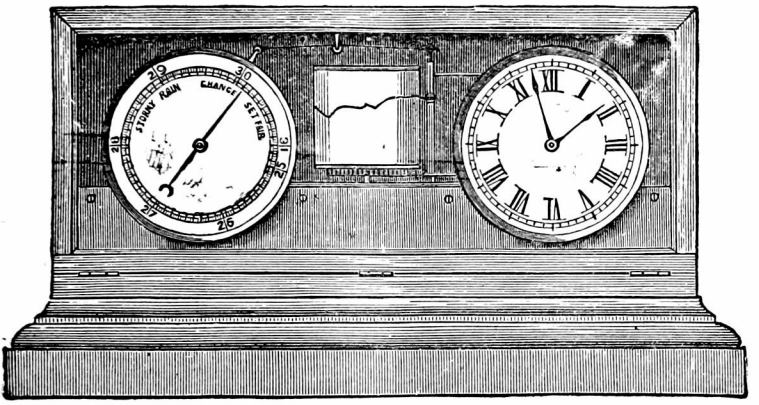
Fig. 18.



Negretti's Improved Milne.

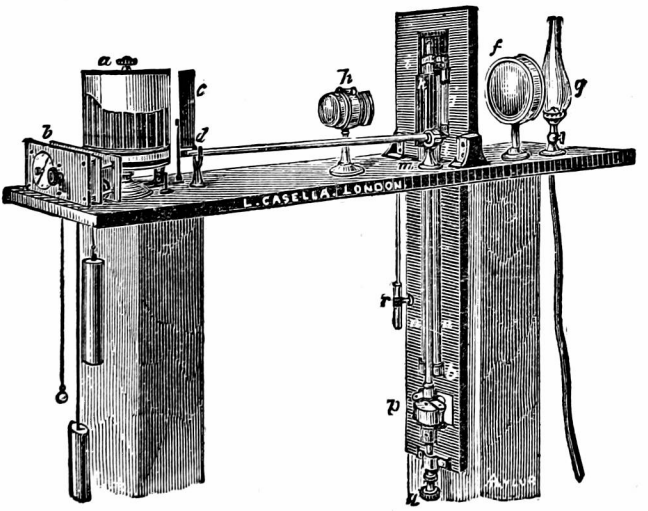
RECORDING BAROMETERS.

Fig. 19.



Recording Aneroid.

Fig. 20.



Kew Barograph.

SELF-RECORDING ANEROIDS.

Although *prima facie* it is evidently undesirable to give an aneroid box any work to do, the use of aneroids as self-recording instruments has steadily extended since their first introduction, about ten years ago. We do not think that even the delicate forms of Breguet [2892] or Pauger [2873] can equal the photographic mercurial barographs, or the clever non-photographic barograph of Redier; but they go near it, and are excellently adapted for use at sea. Pillischer sends a large and well-arranged instrument, suitable for a club or other large entrance hall. Pastorelli sends a smaller one [2885] (fig. 19) adapted for a library or other mantelpiece, and a similar one is sent by Elliott Brothers.

PHOTOGRAPHIC RECORDING BAROMETERS.

In the next place we have barographs recording by means of photography. The two patterns principally employed are represented by early specimens if not actually by the first of each species which was made. We are not sure as to the priority of Mr. Ronalds or Mr. Brooke; the catalogue states that Mr. Ronalds's instrument [2892] was constructed in 1847, the Greenwich volume states that Mr. Brooke's was brought into operation in 1848, for the present we, therefore, take the Ronalds' Barograph first.

Just as the improved form of Kreil's Barograph received, and passes by, the name of Admiral Milne's Barograph, Ronalds' Barograph is now often called the Beckley Barograph, or the Kew Barograph. Indeed the name of the original inventor has been so dropped, that there are probably not six of our readers who before the exhibition was opened knew that the barograph adopted by the Meteorological Committee was in all its essential features that of Ronalds. So much is this the case that we only give an engraving of the Beckley Barograph, fig. 20, and after describing it we will return to the Ronalds instrument, and show wherein it has been improved upon.

g is the source of light, *f* is a lens focussing the light upon the upper part of the barometer tube *k*, *h* is another lens throwing an image of the barometer tube on the drum *a*, which is covered with sensitized paper, and is rotated by the clock *b*. The clock, in addition to driving the drum *a*, is so arranged as to interpose the shutter *c d*, between *a* and *h*, once each hour, this prevents the light reaching the drum, and thus causes white lines, which act as the time scale when the paper is removed from the drum. It is evident that the height of the barometric column is thus continuously photographed on the rotating drum. The arrangement is further improved by the barometric tube being so fixed by zinc bars that the photographic record needs no correction for the temperature of the instrument. Now we return to Ronalds's original instrument, and as far as we can see, its only inferiority was that incidental to the condition of photographic knowledge at the time. His apparatus has not the luxurious finish which modern opticians pay so much attention to, and he adopted a flat daguerreotype plate, which was driven past the image by clockwork.

Brooke's Barograph has been in use at Greenwich for more than a quarter of a century, and that fact alone proves its value. Mr. Brooke from the first, used the revolving paper-covered drum, and the only questionable part of his arrangement is that he does not directly photograph the mercurial column, but uses a syphon barometer, with a float (like Kreil's), and allows the light to pass through a slit, in a plate of mica, carried by the arm. This, of course, introduces the question of friction which may or may not be worth consideration. We presume that the Astronomer Royal has long since satisfied himself that it is unimportant.

(To be continued.)

THUNDERSTORM NEAR LIVERPOOL.

To the Editor of the Meteorological Magazine.

SIR,—A severe thunderstorm passed over this place yesterday afternoon, shortly after 4 p.m. The previous day, Tuesday the 20th, was very hot, shade heat reaching 83°·0. Yesterday, however, was still warmer, the shade maximum being 85°·5, the highest reading of the thermometer since the 22nd July, 1873. About 3.15 p.m. a sudden change occurred, a strong and cold wind setting in from N.W. In one hour, that is to say, from exactly 3 p.m. to 4 p.m., the thermometer fell 15°, and from 3 p.m. to 7 p.m. the change amounted to exactly 30°, a most remarkable variation. Heavy rain fell during the storm, 1·03 inches being registered in 2 hours and 10 minutes. During the storm the upper current of cloud moved slowly from S.S.E to N.N.W. The lightning was very vivid, and the thunder exceedingly loud.—Yours truly,

ARTHUR R. ANDERSSON.

Walton-on-the-Hill, near Liverpool, 22nd June, 1876.

HEAVY RAIN AT BRIGHTON.

To the Editor of the Meteorological Magazine.

SIR,—I send a few particulars as to the rain on June 22nd. Rain bagan at 8, and fell heavily after 8.30.

June 22.				Fall.				Fall.
	8	to	9.37 p.m. ...	0·270	10	to 10.30 p.m. ...		0·430
	9.37	to	9.47 ,, ...	0·170	10.30	to 11 ,, ...		0·360
	9.47	to	9.52 ,, ...	0·040	11	to 9 a.m. June 23		0·645
	9.52	to	9.55 ,, ...	0·015				
	9.55	to	10 ,, ...	0·060				1·990

No measurable quantity after 8 a.m.

Total greatest ever recorded in Brighton.

Dr. Taaffe, on the Steine, had 1·87 inches; "Revilo," Richmond Terrace, 2·15 inches; Brighton College, Eastern Road, Brighton, 1·95 inches; The Dyke, 2·15 inches; Fulking, 1·86 inches.—Yours very truly,

FREDERICK E. SAWYER.

55, Buckingham Place, Brighton, 6th July, 1876.

[At Worthing the fall was only 0·89 in.—Ed.]

JUNE, 1876.

Div.		STATIONS. [The Roman numerals denote the division of the Annual Tables to which each station belongs.]	RAINFALL. Total Fall.	Difference from average 1860–5	Greatest Fall in 24 hours. Dpth	Greatest Fall in 24 hours. Date.	Days on which ·01 or more fell.	TEMPERATURE. Max. Deg.	Max. Date.	Min. Deg.	Min. Date.	No. of Nights below 32° In shade	No. of Nights below 32° On grass
			inches	inches.	in.								
I.	ENGLAND.	Camden Town	1·27	— 1·78	·44	15	11	84·8	21	39·4	11	0	0
II.		Maidstone (Linton Park)	·98	— 1·76	·42	9	9	91·0	21	46·0	1	0	...
,,		Selborne (The Wakes)	2·10	— 1·13	·68	15	12	83·0	21	36·5	11	0	0
III.		Hitchen	1·22	— 1·42	·51	15	12	75·0	20*	36·0	10	0	...
,,		Banbury	2·17	— 1·11	·39	22	13	83·0	21	37·0	11	0	...
IV.		Bury St. Edmunds (Culford)	2·75	+ ·17	·70	15	12	80·0	12*	31·0	10	1	2
V.		Norwich (Sprowston)	1·80	...	·43	16	13	...	...	...	...	...	...
,,		Bridport	2·81	— ·43	1·72	15	8	82·0	20	36·0	11	...	...
,,		Barnstaple	1·25	— 2·87	·31	8	12	84·0	27†	46·0	22	0	...
,,		Bodmin	1·75	— 2·29	·38	14	15	76·0	20‡	41·0	22	0	0
VI.		Cirencester	1·46	— 1·92	·49	15	10	...	...	...	...	...	...
,,		Shifnal (Haughton Hall)	2·52	— ·59	·61	22	16	81·0	21	38·0	1	0	...
,,		Tenbury (Orleton)	1·35	— 2·17	·30	15	12	84·2	21	35·2	11	0	1
VII.		Leicester (Belmont Villas)	1·91	...	·65	13	13	87·5	21	37·8	11	0	...
,,		Boston	3·13	+ ·94	1·43	23	13	82·0	20	42·0	4	0	0
,,		Grimsby (Killingholme)	1·97	...	·59	13	13	70·0	12	39·0	11	0	...
,,		Mansfield	2·55	...	1·19	23	13	84·4	21	35·5	11	0	0
VIII.		Manchester	3·15	— ·19	1·02	23	14	86·0	26	40·0	1,11	0	0
IX.		York	...	...	...	...	...	...	...	...	...	...	..
,,		Skipton (Arncliffe)	3·46	— ·64	·62	23	16	84·0	27	34·0	10	0	...
X.		North Shields	2·03	— ·71	·73	21	14	72·0	11	41·8	11	0	0
,,		Borrowdale (Seathwaite)	8·34	— 2·17	2·32	5	11	...	...	...	...	...	...
XI.	WALES.	Cardiff (Ely)	...	...	...	...	...	...	...	...	...	..	...
,,		Haverfordwest	1·97	— 1·68	·70	14	8	79·5	20	36·0	4	0	1
,,		Machynlleth	2·28	...	·73	3	9	86·5	21	35·0	9	0	0
,,		Llandudno	2·16	— ·13	·68	21	12	86·0	20*	42·4	1	0	..
XII.	SCOTLAND.	Dumfries (Crichton Asylum)	3·11	— ·28	·69	4	11	80·5	21	38·0	1	0	0
,,		Hawick (Silverbut Hall)	2·99	...	·58	21	9	...	...	...	...	...	...
XIV.		Kilmarnock (Annanhill)	...	...	...	...	...	...	...	...	...	...	...
XV.		Castle Toward	3·84	— ·35	·60	5	13	80·0	26	42·0	30	0	...
XVI.		Mull (Quinish)	6·50	...	·95	20	18	...	...	...	...	...	...
,,		Leven (Nookton)	...	...	...	...	...	...	...	...	...	...	...
,,		Grandtully	3·36	...	·67	21	11	...	...	...	...	...	...
XVII.		Braemar	3·14	— ·30	1·30	22	12	78·8	27	32·3	13	0	5
,,		Aberdeen	·98	...	·28	22	9	79·0	25	38·1	3	0	1
XVIII		Loch Broom	2·76	...	·46	4	11	...	...	...	...	...	..
,,		Portree	7·74	+ 2·96	1·04	3	25	...	...	...	...	...	...
,,		Inverness (Culloden)	2·12	+ ·20	·90	23	16	81·2	20	38·8	14	0	2
XIX.		Helmsdale	2·03	...	·47	30	12	...	...	...	...	...	...
,,		Sandwick	1·45	— ·09	·35	3	12	74·4	24	42·6	4	0	0
XX.	IRELAND.	Caherciveen Darrynane Abbey	2·56	...	·47	14	18	...	...	...	...	..	...
,,		Cork	·85	...	·30	15	7	...	...	...	...	...	...
,,		Waterford	1·39	— 1·60	·46	14	12	82·0	26	42·0	17	0	...
,,		Killaloe	3·16	— ·47	·74	4	15	86·0	26	36·5	2,14	0	...
XXI.		Portarlington	1·33	— 1·92	·28	5	13	82·0	26	40·0	9	0	...
,,		Monkstown, Dublin	1·42	— 1·19	·58	8	9	...	...	...	...	...	...
XXII.		Galway	2·27	...	·34	2	20	80·0	27	40·0	1,14	0	...
,,		Ballyshannon	2 08	...	·40	4	14	...	..	...	...	...	...
XXIII		Waringstown	2·47	...	·34	4	19	80·0	26	39·5	5	0	0
,,		Edenfel (Omagh)	2·12	...	·58	4	16	72·0	21	38·0	5	0	...

* And 21. † 28. ‡ 26.

+Shows that the fall was above the average; —that it was below it.

METEOROLOGICAL NOTES ON JUNE.

ABBREVIATIONS.—Bar. for Barometer; Ther. for Thermometer; Max. for Maximum; Min. for Minimum; T for Thunder; L for Lightning; T S for Thunderstorm; R for Rain; H for Hail; S for Snow.

ENGLAND.

LINTON.—Month remarkable for the sudden and frequent changes, of both temperature and wind, the latter especially; very little T, and on the whole a dry month, but not altogether unfavourable to vegetation, which nevertheless keeps late, wheat in a general way being scarcely in ear on the 28th, an unusually late period; most crops want rain, which is also needed in many places for domestic purposes.

SELBORNE.—A cloudy month, with less than the average rainfall. The T S on the 28th was but little felt here (only a few drops of rain falling at 5 p.m.) although very violent within a few miles. Prevailing wind in first week S.W., latter part of month variable.

BANBURY.—9th, 5.25 p.m., very dark with rain; 21st, T S.; two fires were caused by L on this day at Greatworth, in Northamptonshire.

CULFORD.—The grass was crisp with frost on the night of the 2nd; on the night of the 10th the temp. fell to 31°; mean temp. of the month was 59°·1, only slightly under that of June, 1875. Easterly or polar winds prevailed during nine days.

SPROWSTON.—28th, fog in morning, brilliant and warm day, T in evening; 29th, fine day, with T in evening. Rainfall about the average for the month, but for the first six months of the year more than 3 inches above it.

BODMIN.—Average temp. of the month 62°·9; rainfall considerably below the average of the last 27 years.

HAUGHTON HALL, SHIFNAL.—This has been on the whole a pleasant month, and has made up in some measure for the dry and backward spring. The much required R came on the 3rd, and fell daily till the 9th, inclusive, accompanied by a T S on that day from S.W., after that R fell slightly at intervals till 21st, when three consecutive falls of ·19 in., ·61 in., and ·60 in., ushered in by a severe TS, with ther. at 81° did effectual good to swedes and root crops, although too late to benefit the hay crops much. From that date it remained dry, with a change of wind to N. and N.E. Bar. remarkably steady, the range being only from 29·45 to 29·85. Turtle dove first heard on the 2nd; foxglove in blossom on 17th, and wild rose on 20th.

ORLETON.—A fine month, with a variable temp. and much sunlight, the first half generally cold, and the latter fine and warm; the mean temp. slightly above the average. R generally in small quantities, and total much below the average. T and L on 9th, and T on 21st.

LEICESTER.—Heavy R (·65 max. of month) on the evening of the 13th. Nearly all the R fell in the first half of the month; very hot on 20th and 21st, TS on the latter date, but only ·05 of R fell here; mean temp. of month, 57°·6. The weather during the month was very favourable for vegetation, which was very backward in May. Hay harvest not general at the close of the month.

BOSTON.—T and L on 22nd. From 9 a.m. to 6 p.m. on 23rd, 1·40 of R fell.

GRIMSBY.—T at 2.45 p.m. on 12th, T and R at 4.30 a.m. on 22nd, and sheet L at night, and T and R at 4 a.m. on 23rd. Four sheep killed a few miles hence, and houses were struck in some parts of the country. Wild rose began to flower on 13th. A fine month, bar. steady. Corn crops not heavy, but those of hay and clover good, and grass in pastures abundant. Good promise of root crops, and trees have made long shoots. In many places the frosts ruined the gooseberries, and wall fruit is scarce.

MANSFIELD.—21st, very sultry, T and L; 22nd, showery; 23rd, a thorough downpour all day, total fall, 1·19; 24th to the end, warm, dull, with alternate sunshine, but no rain till 30th, and then only ·01. The month has been a very pleasant one, very little T; max. bar. on 1st; min. bar. on 5th, mean temp. at 9 a.m. 60° 5.

MANCHESTER.—T in after part of 16th.

ARNCLIFFE.—A beautiful sunny month, with R enough to enrich the grass lands.

NORTH SHIELDS.—T on 21st, 22nd, 23rd, and 28th; L on 29th, with remarkable fall of R about midnight, ·50 falling in less than a quarter of an hour.

SEATHWAITE.—T and L on 20th.

WALES.

HAVERFORDWEST.—General character of the month to the 19th cold and ungenial, days of bright sunshine with easterly winds, cloudy days with westerly and N. westerly winds; some nights of severe cold. On the 20th, sudden intense heat (79·5) with cloudless sky and half a gale from the E. Weather electrical and much disturbed, with great heat for three or four days; after which weather warm and pleasant to the end. Ther. at or above 70° on six days. In consequence of the extreme dryness of the season, the hay crop is very light and deficient.

MACHYNLLETH.—A very fine month, rather dry for this part. T on 21st at 1 p.m. and distant T on 27th, about 3 p.m. Very stormy on 17th.

LLANDUDNO.—Fine month, temp. slightly above the average. It rose to the unusual height of 86° on 20th, followed by a TS on 21st, with heavy fall of R. Began to cut hay on 22nd; oats, wheat, and barley shot on 23rd.

SCOTLAND.

DUMFRIES.—A fine breezy month, without violent winds. Mean temp. 56°·7, 3° higher than last year; T only heard once; R about the average.

HAWICK.—High winds on 3rd, 4th, 5th, 7th, and 21st. General failure of gooseberries, and great complaints of the light crops of strawberries, caused by the frosts of May. Currants are beautiful, and apples and pears have set well. The fine rain of the 21st and 22nd were most beneficial, and blessed by the genial sun during the last eight days, the crops are progressing most rapidly.

CASTLE TOWARD.—The weather in the beginning of the month very changeable and cold, heavy falls of H occurring during the month. We had some very warm days; on the 26th the ther. registered 80°, which is the highest we have had for years. Things in general are a little late, but not so much as was anticipated. Turnips and potato crops are looking well in this district.

BRAEMAR.—A seasonable month throughout, with the exception of a rather severe frost on the 13th. Crops looking well.

ABERDEEN.—A month of fine, warm, but too dry weather. Temp. very slightly above the average. Rainfall about half the average.

LOCHBROOM.—From 3rd to 8th cold and stormy, after then generally dry and fine. Vegetation much retarded by want of warmth and rain.

PORTREE.—A very wet, stormy month, the wettest (7·74) June on record, the fall being 3 in. above the average. Heavy H showers on 4th, 5th, 6th, and 7th; gale from S. on 10th from 6 to 8 p.m. Solar halo on 18th from 5 to 8.30 p.m.

CULLODEN.—High winds on 4th and 19th, S. to S.S.W.; H on 9th; very hot on 20th, 81°·2 in the shade, and 135°·2 in the sun, wind S. to S.E., brisk breeze, bright and clear sunshine. 25th, 78°·8 in shade, 135° in sun; brisk wind, E.S.E.

SANDWICK.—A very pleasant month, from 19th to end it was warm for this latitude, the temp. in the shade on the 24th reaching 74°·4, and in the sun 104°·3, while there was a difference of 13°·1 between the wet and dry ther. Only ·23 of R fell from the 7th to the 30th, and the farmers were very pleased to have ·28 on that night.

IRELAND.

DARRYNANE.—R about the average, and has been of great service to the crops, and above all to the grass, which was very backward. Winds variable, usually moderate, but fresh gales on 3rd, 14th, and 21st, all from W. High sea on 20th and 21st.

MONKSTOWN.—Very fine and generally warm month, latter part very dry, only ·01 in. of R from 16th to the end.

BALLYSHANNON.—The weather during the month has been good for the growth, and crops have progressed favourably, with the exception of flax, which will be a poor crop here in consequence of the continued drought. Rainfall less than the corresponding period last year by 1·35 in.

WARINGSTOWN.—Warm, stormy, and changeable.

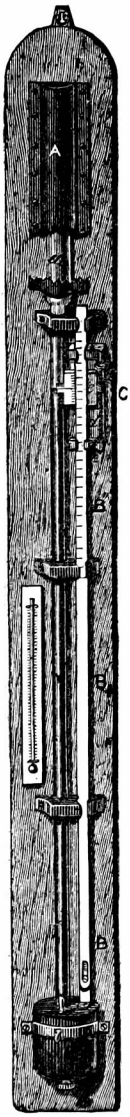
OMAGH.—A very favourable month, the R and warmth of which have well nigh remedied the damage done by an unprecedentedly inclement spring.

SUPPLEMENTARY TABLE OF RAINFALL IN JUNE, 1876.

[For the Counties, Divisions, Latitudes, and Longitudes of these Stations, see Met. Mag., Vol. XI., p. 28.]

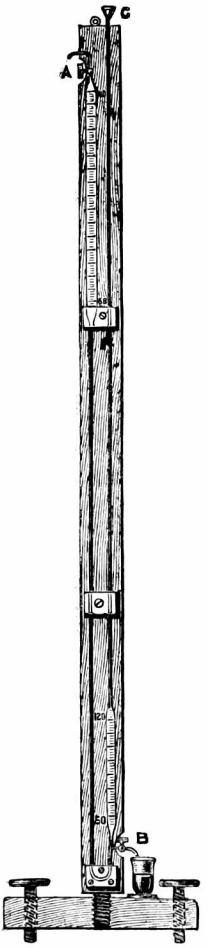
Station.	Total Rain.	Station.	Total Rain.
	in.		in.
Acol	1·68	Llanfrechfa	1·92
Hailsham	2·15	Castle Malgwyn	1·93
Andover	2·07	Heyope	1·62
Strathfield Turgiss	2·06	Rhug, Corwen	1·28
Addington Manor	1·59	Port Madoc	2·54
Oxford	1·96	Melrose	3·16
Cambridge	1·60	Cessnock, Glasgow	3·09
Sheering	1·28	Gruinart	4·27
Ipswich	1·68	Keith	1·12
Diss	2·10	Strathconan	3·20
Swaffham	2·17	Springfield, Tain	2·06
Compton Bassett	1·43	Skibbereen	1·17
Dartmoor	3·98	Glenville, Fermoy	1·27
Teignmouth	1·16	Tralee	2·88
Torrington (Langtree)	2·24	Newcastle W., Limerick	1·46
Trevarrick, St. Austell	1·49	Kilrush	1·22
Taunton	1·45	Kilkenny	1·11
Bristol	...	Kilsallaghan	1·83
Sansaw	1·90	Twyford, Athlone	1·69
Cheadle	2·91	Ballinasloe	1.54
Ashby-de-la-Zouch	2·43	Kylemore	6·11
Coston, Melton Mowbray	2·25	Bangor	4·99
Bucknall	2·70	Carrick on Shannon	1·83
Walton, Liverpool	2·58	Rockcorry	1·41
Broughton-in-Furness	4·76	Warrenpoint	2·48
Stanley, Wakefield	1·96	Bushmills	2·97
Gainford	2·42	Buncrana	2·57
Shap	4·53		

Fig. 21.



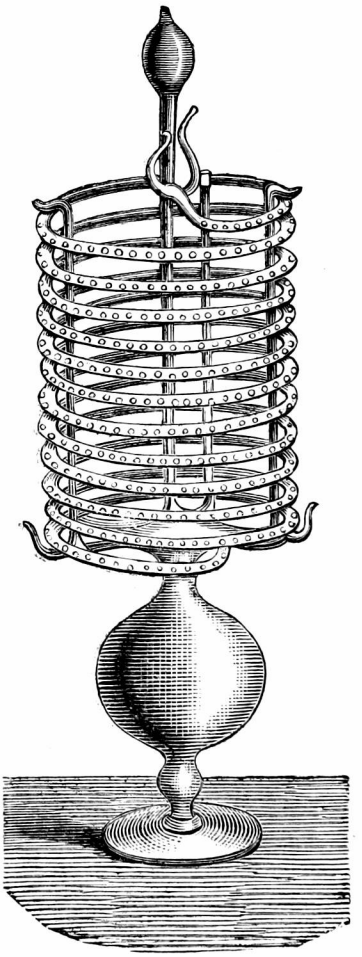
Krueger's Barometer.

Fig. 22.



Bohn's Barometer.

Fig. 23.



Cimento Thermoscope.